Hylaeus (Nesoprosopis) paumako (Hymenoptera: Colletidae), a New Endemic Bee from Moloka‘i, Hawai‘i

Karl N. Magnacca
Center for Conservation Research and Training, University of Hawai‘i at Mānoa, Honolulu, Hawai‘i, USA, 96822; email: knm956@gmail.com
ORCID https://orcid.org/0000-0003-3803-7506;
https://zoobank.org/urn:lsid:zoobank.org:author:8F9AD34D-9277-48A0-9F1B-60901C74A289; this work: https://zoobank.org/urn:lsid:zoobank.org:pub:C90E797A-1F93-4C64-87C8-4AC4DBBA54C6

Abstract. *Hylaeus paumako* new species, a new native bee from dry-mesic forest on Moloka‘i, is described. This is the first new bee species discovered on Moloka‘i in over 100 years, and the first from Moloka‘i where males lack colored facial marks. It was taken in company with *H. connectens* and *H. laetus*, both of which also had not been seen on the island for decades.

Key words: Hawaii, bees, pollinator conservation, endangered species

The island of Moloka‘i has been incompletely surveyed for native *Hylaeus (Nesoprosopis)* bees (Magnacca 2007a). Although montane wet forest and coastal habitat have been searched relatively thoroughly (Daly and Magnacca 2003, Magnacca 2007b), dry shrubland and mesic forest areas have not, largely due to the difficulty of accessing the steep ridges and gulches of the southern slopes, together with the highly eroded landscape and fragmented nature of remnant habitat. In recent years, a large area of forest and shrubland on the south slope of east Molokai has been fenced and ungulates removed, allowing native vegetation to recover. Recently, broad-scale general insect surveys have started in this area for the first time in over 100 years. During a visit to a remnant patch of mesic forest at Mākolelau, a new species of *Hylaeus* was found, immediately recognizable by males without any facial marks.

Material and Methods

Mākolelau Gulch was visited as part of a general insect survey on May 17 and August 21, 2024. Bees were collected at flowers by net using targeted search, by waiting at heavily-flowering plants and catching individuals as they flew over or landed on the flowers. Specimens were imaged at the Bernice Pauahi Bishop Museum (BPBM) using a Leica Automontage system and LAS X software (Leica Microsystems Inc.), and focus stacks produced using Helicon Focus 8. Description conventions follow Daly and Magnacca (2003). Setae length is expressed in units of hundredths of a millimeter (usually equivalent to eyepiece micrometer tic marks at 10× magnification on a dissecting microscope, but calibration with a stage micrometer is necessary for accuracy).

Taxonomy

Hylaeus (Nesoprosopis) paumako n. sp.
Figs. 1, 2.
https://zoobank.org/urn:lsid:zoobank.org:act:E4B78FBB-6248-4554-836E-65E4C046FD07

Diagnosis. This species keys poorly to *H. coniceps* (Perkins) in Daly and Magnacca (2003). It is readily separated from that species and all others on Moloka'i by the complete lack of yellow markings. In addition, the dorsal propodeum is coarsely reticulate-rugose rather than longitudinally striate. Superficially similar to *H. rugulosus* (Perkins) of Hawai'i which also has the face unmarked, but the supraclypeal area is as wide as long, frons punctate and dull above antennal sockets, female mandible not modified, and male genitalia different.

Description. ♂ **Head.** Malar space very short, length about 0.4–0.5 times diameter of median ocellus. Upper paraocular area with close punctation dorsally, about 1 pit width apart near dorsal margin of eye, becoming sparser ventrally; lower paraocular area impunctate ventrad of toruli, transversely striate; paraocular depression shallow. Median frons with dense, crowded punctures, somewhat polygonal but not strongly distorted, not obscured by setation; ground dull. Frontoclypeal sulcus nearly straight; supraclypeal area about as wide as long. Scape in frontal view moderately dilated, ratio about 0.7; lateral edge in frontal view nearly straight; weakly arched in lateral view; underside of median edge with a shallow groove; with long, golden, simple setae along median edge. Vertex setae 16–24, pale brown, weakly plumose.

Mesosoma. Mesoscutum with distinct punctures 2–3 pit widths apart, ground minutely granular, dull; setae of mixed lengths, moderately long (10–20), pale brown, plumose. Mesoscutellum dull but slightly shinier than mesoscutum. Mesepisternum with shallow but distinct pits about 1 pit width apart, ground dull, with long, pale brown, densely plumose setae. Hypoepimeron appearing impunctate (shallowly rugulose when viewed at a strongly oblique angle), weakly lustrous, slightly swollen. Metanotum finely rugulose, dull. Basal area of propodeum entirely coarsely reticulate; dorsal surface shorter than scutellum, brow strongly rounded.

Metasoma. Disk of T2 impunctate, smoothly coriaceous, somewhat dull, with fine, pale, prostrate setae spaced about 1 seta length apart. Apical area of tergites translucent, appearing brown. Setae of T7 dark brown, medium to long, erect.

Terminalia. Lateral process of S7 narrow and pointed apically, hemisternite length equal to width; hemisternite very broadly L-shaped. Median process of S8 swollen at base, moderately dilated and arched, with prominent hump near middle, apex with moderately long and broad tips, spreading in Y shape. Apices of gonoforceps scarcely exceeding penis valves, inwardly bluntly pointed.

Color. Entirely black except anterior surface of fore tibia pale yellow. Wings slightly smoky.

♀ **Head.** Malar space shorter, length about 0.3 times diameter of median ocellus. Upper paraocular area similar to male; lower paraocular area with sparse punctures ventrad of toruli, striation very weak; paraocular depression absent. Median frons with punctures denser but not as much as in male, slightly less than a pit width apart except for 2–3 rows along midline which are distorted into striae; interspaces somewhat shining. Supraclypeal area about 2.4 times as wide as long. Apex of clypeus slightly concave. Mandible unmodified, of typical form, with two teeth. Dorsal end of facial fovea extended to level of lateral ocellus. Vertex setae 10–20, dark brown, weakly plumose.

Mesosoma. Similar to male, except setae of mesoscutum shorter, 8–14, and mesepisternum with smaller, slightly more separated punctures. Rugae of propodeum slightly weaker and more closely spaced.

Metasoma. Similar to male.

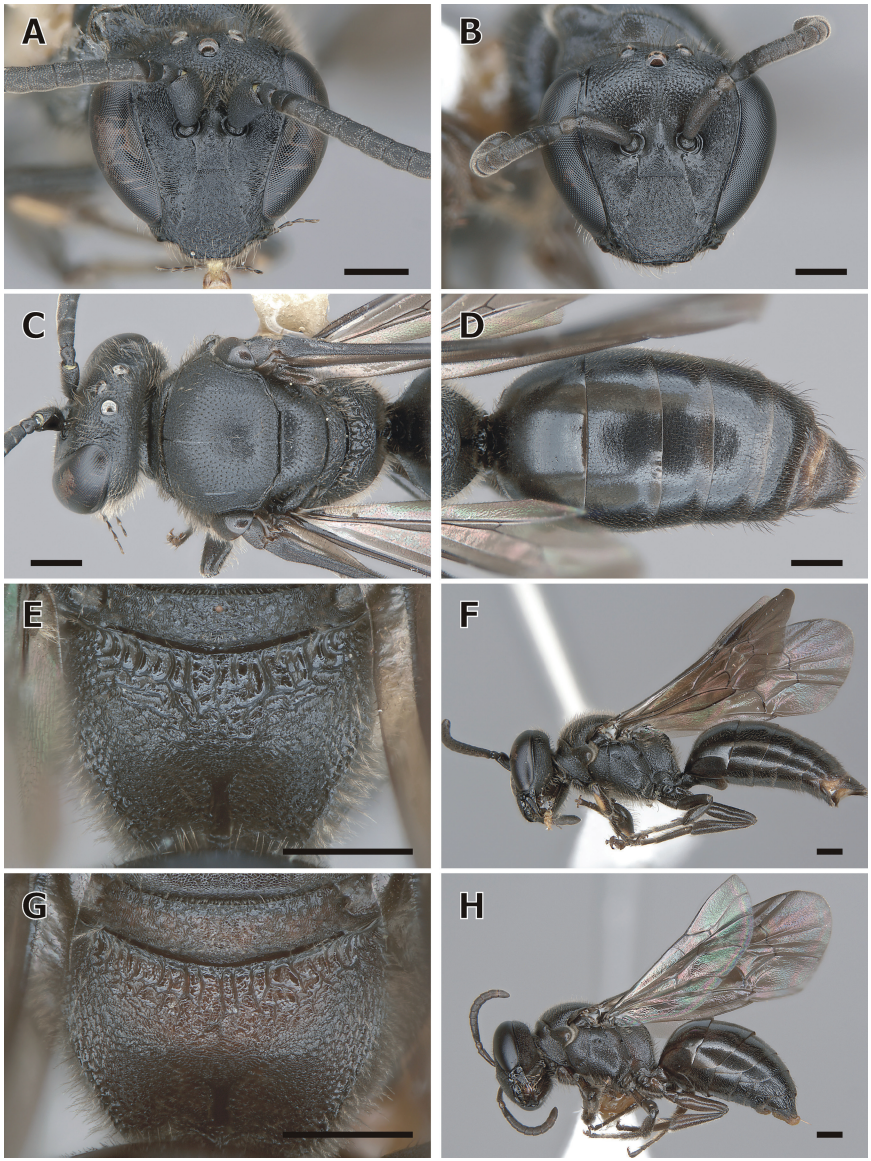

Figure 1. *Hylaeus paumako*, holotype ♂ (A, C–F) and allotype ♀ (B, G–H). A) Male head, frontal view. B) Female head, frontal view. C) Male mesosoma, dorsal. D) Male metasoma, dorsal. E) Male propodeum. F) Male lateral habitus. G) Female propodeum. H) Female lateral habitus. Scale bars indicate 0.5 mm.

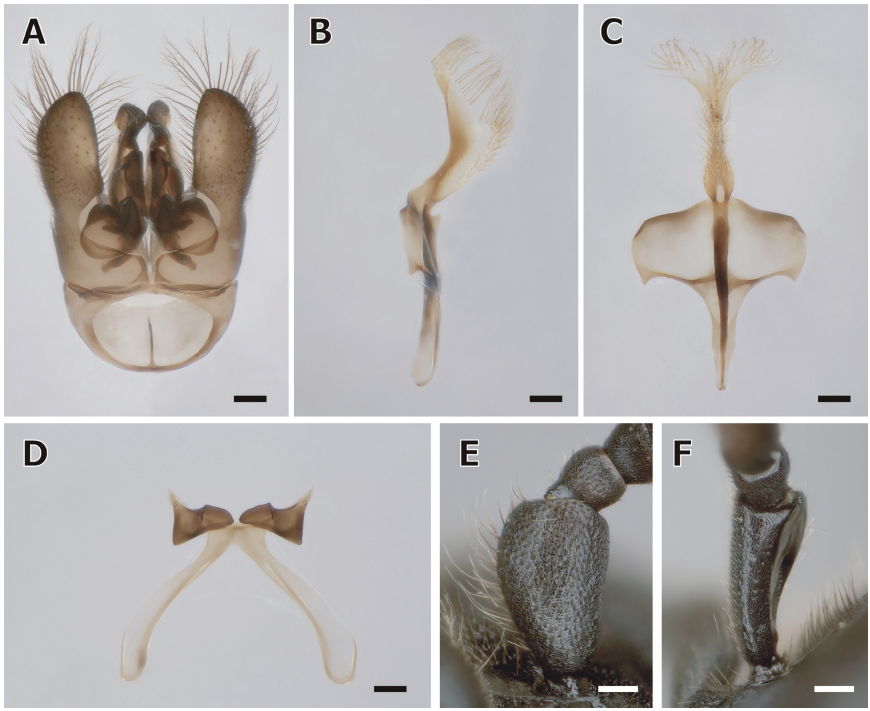

Figure 2. *Hylaeus paumako*, holotype ♂. A) Genital capsule, ventral view. B–C) Eighth sternum, ventral and lateral views. D) Seventh sternum, ventral view. E) Left antennal scape, medial (frontal) view. F) Scape, ventral view. Scale bars indicate 0.1 mm.

Color. Entirely black. Wings slightly smoky.

Holotype. Molokaʻi: ♂ (BPBMENT1000002530), Mākolelau, 850 m, on *Senna gaudichaudii*, 17 May 2024, K.N. Magnacca, M24051705-01.

Paratypes. Molokaʻi: 2 ♀, same data as holotype, BPBM.

Etymology. From the Hawaiian *paumākō*, mourning or grief, referring to the all-black coloration. It is a noun in apposition.

Discussion

The discovery of this species, the first new *Hylaeus* to be found on Molokaʻi in over 125 years, shows that much remains to be found in study of the native bees despite apparent declines in abundance. In addition, it was collected in company with *H. connectens* (Perkins) and *H. laetus* (Perkins), two species that had not been collected on Molokaʻi in over 100 years (Magnacca 2007a). The type locality, a gulch with native dry-mesic forest and invasive weedy shrubs and grasses, was visited again in August 2024 and the *Senna* still had a few flowers, but no more bees were found. Nearly all the new *Hylaeus* species found in the past 25 years have come from mesic forests (Daly and Magnacca 2003, Magnacca 2011, 2013), much of which remain poorly sampled for bees. Rare plants such as *Senna gaudichaudii* (Fabaceae), which all three were collected at, are especially undersurveyed for native pollinators.

Hylaeus paumako is probably most

closely related to *H. rugulosus* based on the very similar S8, propodeal sculpture, and lack of any markings. However, S7 is quite different, most closely resembling *H. kona* (Perkins) of Hawai‘i. In the phylogeny of Magnacca and Danforth (2006) those two species were not closely related, and *H. rugulosus* was tentatively placed on a long branch as sister to the very different-looking *H. solaris* Magnacca and Daly. This suggests that more related species may exist in this group that remain to be discovered, or may possibly be extinct. The female of *H. rugulosus* has a peculiar modified short, truncate mandible (see Fig. 9C in Daly and Magnacca 2003), unique among Hawaiian species, the function of which is unknown. The females of *H. paumako* have the mandible of typical form, elongate with two teeth. Like many native species, *H. rugulosus* has been mainly collected at flowers of ‘ōhi‘a lehua (*Metrosideros polymorpha*) but seems to be particularly associated with rocky sites such as open dry forest and recent lava flows, using crevices and bubbles in lava rock to nest (Daly and Magnacca 2003). Thus the mandible form may be related to excavating debris-filled holes rather than to floral visitation. The locality where *H. paumako* was found is a gulch bottom lined with medium sized talus boulders, which may be an indicator of a similar nesting habit despite differing mandible shape. Such areas should be searched elsewhere on Moloka‘i and the other islands for this and other potential relatives.

Acknowledgments

Thanks to Ane Bakutis, Cynthia King, and Janis Matsunaga of the Division of Forestry and Wildlife, Dept. of Land and Natural Resources, for support and access to collecting sites. Thanks also to the Helm/Bakutis ‘ohana for their hospitality on Moloka‘i. Funding was provided by DOFAW and the U.S. Fish and Wildlife Service.

Literature Cited

Daly, H.V., and **K.N. Magnacca**. 2003. Hawaiian *Hylaeus (Nesoprosopis)* Bees (Hymenoptera: Apoidea), Insects of Hawaii. Honolulu: University of Hawaii Press.

Magnacca, K.N. 2007a. Conservation status of the endemic bees of Hawai‘i, *Hylaeus (Nesoprosopis)* (Hymenoptera: Colletidae). Pacific Science 61(2): 173–191.

Magnacca, K.N. 2007b. New records of *Hylaeus (Nesoprosopis)* and *Ceratina* bees in Hawai‘i. Bishop Museum Occasional Papers 96: 44–45.

Magnacca, K.N. 2011. Two new species of *Hylaeus (Nesoprosopis)* (Hymenoptera: Colletidae) from O‘ahu, Hawai‘i. Zootaxa 3065(1): 60–65.

Magnacca, K.N. 2013. *Hylaeus (Nesoprosopis) mamo* (Hymenoptera: Colletidae), a new endemic bee from Oahu, Hawaii. Proceedings of the Hawaiian Entomological Society 45: 59–63.

Magnacca, K.N., and **B.N. Danforth**. 2006. Evolution and biogeography of native Hawaiian *Hylaeus* bees (Hymenoptera: Colletidae). Cladistics 22(5): 393–411.